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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/589,043	08/10/2006	Hideki Oki	S1459.70129US00	4064

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EXAMINER	
BEST, ZACHARY P	

ART UNIT	PAPER NUMBER
1727	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)
	10/589,043	OKI ET AL.
	Examiner	Art Unit
	Zachary Best	1727

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 March 2011*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

ELECTROCHEMICAL DEVICE AND ELECTRODE SUITABLE FOR USE IN PRIMARY AND/OR SECONDARY BATTERIES

Examiner: Z. Best S.N. 10/589,043 Art Unit: 1795

DETAILED ACTION

1. Applicant's amendment filed March 15, 2011 was received. Claims 1, 10, and 21-22 were amended. Claims 1-22 are currently pending examination.

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 103

3. The claim rejections under 35 U.S.C. 103(a) of Claims 1-20 and 23-24 as being unpatentable over Hoffman et al. (US 4,894,302) in view of Mayes et al (US 2002/0048706 A1) and Sato et al. (US 2002/0122985 A1), and depending rejections, are withdrawn because independent Claims 1 and 10 were amended.

4. Claims 1-14 and 16-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aurbach et al. (US 2001/0049060 A1) in view of Mayes et al (US 2002/0048706 A1) and Sato et al. (US 2002/0122985 A1).

Regarding Claim 1, Aurbach et al. teach an electrochemical device (abstract), which comprises a first pole, a second pole, and an ionic conductor (abstract), wherein said first

pole contains an active material comprising at least Co (par. 79), a conductive material comprising carbon (par. 87); and said ionic conductor containing Mg, Al, or Ca (pars. 64-65), and), wherein the active material exhibits rechargeable battery action as a result of ions from the ionic conductor interacting with particles in the active material (fig. 2), and wherein the battery can be operated (discharged) at 1.5 V (par. 69). However, Aurbach et al. fail to teach the conductive material comprising a mixture of fine graphite powder and fine carbon powder, the particle size of the fine carbon powder, or the particle size of the active material.

Mayes et al. teach an electrochemical cell comprising an electrochemical reaction wherein an ion conductive species is intercalated into a host material during the electrochemical reaction (par. 7), wherein the ion host particles preferably between 10 nm to 80 μm in diameter because the use of finer particles minimizes the detrimental effects of volume change occurring naturally during the intercalation of the ion conductive species (par. 106), and the ion host particles are mixed with a conductive material such as a mixture of carbon black and graphite (par. 165). Mayes et al. further suggest the ion conductive species may be calcium or magnesium ions (par. 103). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the active material of Hoffman et al. have an average particle diameter as small as 1 nm Mayes et al. teach that smaller particle sizes in electrochemical cells where intercalation occurs minimize the detrimental effects of volume change of the host material. Discovery of an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272 (CCPA 1980).

Sato et al. teach an active material powder mixture for batteries (abstract, see also claim 1), comprising a conductive carbonaceous material created from a mixture of graphite and carbon black having a particle size on the order of nanometers (par. 78) so as to increase the contact area between the conductive material and the active material (par. 15). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to create the electrochemical device of Hoffman et al. and Mayes et al. having a conductive carbonaceous material created from a mixture of graphite and carbon black having a particle size on the order of nanometers because Sato et al. teach it will increase the contact area between the conductive material and the active material (par. 15).

Regarding Claim 2, Aurbach et al. teach the electrochemical device of the first pole is manganese oxide or cobalt oxide (par. 79).

Regarding Claim 3, Aurbach et al. teach said cobalt oxide (Co_3O_4), which has a ratio of M/X of 0.75 (par. 79).

Regarding Claim 4, Mayes et al. teach the active material particle size is between 10 nm to 80 μm in diameter (par. 106).

Regarding Claim 5, Aurbach et al. teach the first pole is formed from the active material mixed with a conductive material and a polymeric binder (par. 87).

Regarding Claim 6, Aurbach et al. teach said ions from the ionic conductor are Mg, Al, or Ca (pars. 64-65).

Regarding Claim 7, Aurbach et al. teach said second pole contains magnesium (par. 87).

Regarding Claim 8, Aurbach et al. teach said ionic conductor is a solid electrolyte (claim 1).

Regarding Claim 9, Aurbach et al. teach said electrochemical device is a secondary battery (fig. 2).

Regarding Claim 10, Aurbach et al., Mayes et al., and Sato et al. teach the electrochemical device as recited in Claim 1, and Aurbach et al. teach the electrochemical device of the first pole is manganese oxide or cobalt oxide (par. 79).

Regarding Claim 11, Aurbach et al. teach combinations of compounds being represented by the general formula MX (par. 79).

Regarding Claims 12-13, Aurbach et al. teach said electrochemical device is a secondary battery (fig. 2), and Aurbach et al. suggest the crystal structure and/or state is observably unchanged after charging and/or discharging during at least one cycle (par. 69, see also fig. 2).

Regarding Claim 14, Aurbach et al. teach said cobalt oxide (Co_3O_4), which has a ratio of M/X of 0.75 (par. 79).

Regarding Claims 16-17, Mayes et al. teach the active material particle size is about 100 nm (par. 106).

Regarding Claim 18, Aurbach et al. teach said ions from the ionic conductor are Mg, Al, or Ca (pars. 64-65).

Regarding Claim 19, Aurbach et al. teach said second pole contains magnesium (par. 87).

Regarding Claim 20, Aurbach et al. teach the first pole is formed from the active material mixed with a conductive material and a polymeric binder (par. 87).

Regarding Claims 21-22, Aurbach et al. teach the ionic conductor is $Mg(AlCl_2EtBu)_2$ (claims 5-6).

5. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Aurbach et al., Mayes et al., and Sato et al. as applied to Claims 1-14 and 16-22 above, and further in view of Hoffman et al. (US 4,894,302).

Regarding Claim 15, Aurbach et al., Mayes et al., and Sato et al. teach the electrochemical device as recited above. However, Aurbach et al., Mayes et al., and Sato et al. are not specific to a compound wherein a ratio of M to X is between 0.5 and 0.7.

Hoffman et al. teach an electrochemical device having an ionic conductor wherein the ions from the ionic conductor are Mg, Al, or Ca (claims 1-2), wherein the first pole may be Co_3O_4 or Mn_2O_3 (col. 5, line 65 - col. 6, line 2). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to substitute Mn_2O_3 - for the Co_3O_4 of Aurbach et al. because Hoffman et al. teach functional equivalency of said active materials.

Response to Arguments

6. Applicant's arguments filed March 15, 2011 have been fully considered but they are not persuasive or are moot in view of the new grounds of rejection.

Applicant argues:

(a) Sato et al. and Mayes et al. may not be used in combination as secondary references because they teach away from such a combination due to preferred particle sizes of the individual reference's teachings on the active material particle size and conductor particle size.

In response to Applicant's arguments:

(a) At the outset, Examiner does not believe that the background discussion of "conventional" art offered by either reference is probative evidence of the specific teachings of Sato et al. and Mayes et al.

Regardless, Sato et al. teach that the average particle size of the electrically conductive powder is smaller than the active material so that the electrically conductive powder particles may adhere to the particles of the active material (par. 54). Sato et al. suggest in one embodiment that the electrically conductive powder particle size is from 10 nm (0.01 μm) - 10 μm when the active material particle size is 0.1 - 100 μm (pars. 14, 54). Sato et al. further teach the preferred range of electrically conductive powder particle size is on the order of nanometers (par. 78).

Mayes et al. teach the ion host particles preferably between 10 nm to 80 μm in diameter because the use of finer particles minimizes the detrimental effects of volume change occurring naturally during the intercalation of the ion conductive species (par. 106).

Examiner does acknowledge that if the smallest end of the large range taught by Mayes et al. is used, the electrically conductive powder particles as taught by Sato et al. may not be smaller than the active material. However, Mayes et al. teach a wide range wherein the ion host particles can benefit from the minimization of detrimental effects of intercalation, and Examiner believes one skilled in the art would more than understand how to combine the teachings of Sato et al. and Mayes et al. without being led in a divergent direction. In other words, while Sato et al. may limit the workable range of Mayes et al. when the references' teachings are combined, one skilled in the art would be more than capable of understanding that the teachings of Sato et al. can be applied to the majority of the range of ion host particle sizes of Mayes et al. The limitation of the range of Mayes et al. by the teachings of Sato et al. therefore does not rise to the magnitude of "teaching away."

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Zachary Best whose telephone number is (571) 270-3963. The examiner can normally be reached on Monday to Thursday, 7:30 - 5:00 (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dah-Wei Yuan can be reached on (571) 272-1295. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Zachary Best/
Examiner, Art Unit 1727

/Dah-Wei D. Yuan/
Supervisory Patent Examiner, Art Unit 1727